

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
8 July 2004 (08.07.2004)

PCT

(10) International Publication Number
WO 2004/057460 A3

(51) International Patent Classification⁷: **G06T 7/20**

(21) International Application Number:
PCT/IB2003/005474

(22) International Filing Date:
20 November 2003 (20.11.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
02080533.9 20 December 2002 (20.12.2002) EP
03102487.0 8 August 2003 (08.08.2003) EP

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SETHURAMAN, Ramanathan** [IN/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **ERNST, Fabian, E.** [DE/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

MEUWISSEN, Patrick, P., E. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **PETERS, Harm, J., A., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **PESET LLOPIS, Rafael** [ES/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: **GROENENDAAL, Antonius, W., M.**; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

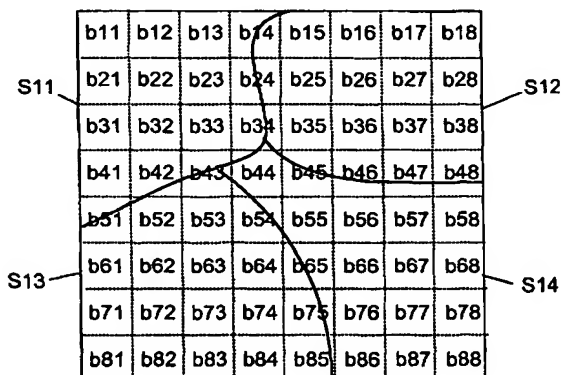
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

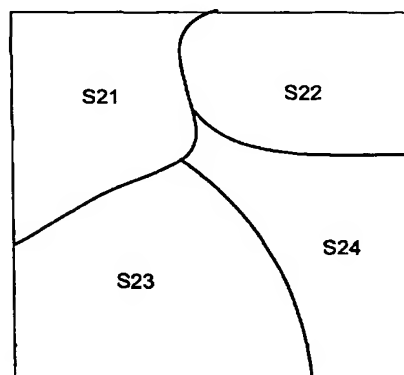
[Continued on next page]

(54) Title: SEGMENT-BASED MOTION ESTIMATION

100



102



(57) Abstract: A method to determine motion vectors for respective segments (S11-S14) of a segmented image (100) comprises: creating sets of candidate motion vectors for the respective segments (S11-S14); dividing the segmented image (100) into a grid of blocks (b11-b88) of pixels; determining for the blocks (b11-b88) of pixels which of the candidate motion vectors belong to the blocks (b11-b88), on basis of the segments (S11-S14) and the locations of the blocks (b11-b88) within the segmented image (100); computing partial match errors for the blocks (b11-b88) on basis of the determined candidate motion vectors and on basis of pixel values of a further image (102); combining the partial match errors into a number of match errors per segment; selecting for each of the sets of candidate motion vectors respective candidate motion vectors on basis of the match errors; and assigning the selected candidate motion vectors as the motion vectors for the respective segments (S11-S14).

WO 2004/057460 A3



Declaration under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK,

EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:

28 October 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IB 03/05474

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06T7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06T H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 304 602 B1 (YOKOYAMA YUTAKA) 16 October 2001 (2001-10-16) abstract	1,8
A	WO 02/093488 A (KONINKL PHILIPS ELECTRONICS NV) 21 November 2002 (2002-11-21) page 7, line 32 - page 8, line 10 ----- -/--	1,8

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

22 July 2004

Date of mailing of the international search report

20/08/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Chateau, J-P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 03/05474

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	AMER A ET AL: "Object-based postprocessing of block motion fields for video applications" PROC. SPIE - INT. SOC. OPT. ENG. (USA), PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING, 2000, SPIE-INT. SOC. OPT. ENG, USA, vol. 3974, 2000, pages 415-424, XP002289572 ISSN: 0277-786X page 421, paragraph 3 - page 422, paragraph 3.3	1,8
A	TEH J S Y ET AL: "Robust region-based motion estimation for video compression" PROCEEDINGS OF 7TH 2000 INTERNATIONAL CONFERENCE ON IMAGE PROCESSING, VANCOUVER, BBC , CANADA, 10-13 SEPT. 2000, 2000, pages 848-851, XP010530748 PISCATAWAY,NJ, USA, IEEE, USA ISBN: 0-7803-6297-7 page 849, right-hand column, paragraph 4 - page 850, paragraph 5; figure 1	1,8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 03/05474

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6304602	B1	16-10-2001	JP 2870415 B2	17-03-1999
			JP 8063601 A	08-03-1996
			US 6005625 A	21-12-1999
WO 02093488	A	21-11-2002	EP 1402477 A2	31-03-2004
			WO 02093488 A2	21-11-2002
			US 2003035583 A1	20-02-2003